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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,694	03/29/2004	Shinji Himori	250832US2XCONT	1192
22850	7590	03/27/2006	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			CROWELL, ANNA M	
			ART UNIT	PAPER NUMBER
			1763	
DATE MAILED: 03/27/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/810,694

Applicant(s)

HIMORI ET AL.

Examiner

Michelle Crowell

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>03/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

Claims 1-8 are pending in the application. Claims 1-8 are rejected.

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on March 29, 2004 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

Art Unit: 1763

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 4-6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Westendorp et al. (U.S. 5,565,036) and Suemasa et al. (U.S. 6,089,181).

Referring to Figure 9 and column 5, lines 34-43, Kim et al. discloses a plasma processing apparatus comprising: a vacuum chamber 10 in which predetermined processing is to be applied on a substrate 13 to be processed by action of plasma on the substrate to be processed, inside of the vacuum chamber being airtightly closable (col. 2, lines 9-11); a bottom electrode 92 provided in said vacuum chamber and configured to have the substrate to be processed placed thereon (Fig. 9); a top electrode 11 provided to face said bottom electrode (Fig. 9); a processing gas supply mechanism 21 configured to supply predetermined processing gas into said vacuum chamber (Fig. 2, col. 48-52); a first radio-frequency power source 96 configured to supply a radio-frequency power with a predetermined first frequency to said bottom electrode 92; a second radio-frequency power source 97 configured to supply to said bottom electrode a radio-frequency power with a second frequency; a first power feeder being configured to feed the radio-frequency power with the first frequency to said bottom electrode from a center portion of said bottom electrode (Fig. 9 and col. 5, lines 34-39); and a second power feeder being configured to feed the radio-frequency power with the second frequency to said bottom electrode from an outer peripheral portion of said bottom electrode (Fig. 9 and col. 5, lines 34-39).

Kim et al. fail to specifically teach that the second frequency is lower than the first frequency.

Referring to Figure 7 and column 10, lines 42-53, Westendorp et al. teaches a plasma processing apparatus wherein the second frequency 90 of 400 kHz is lower than the first frequency 16 of 60 MHz since lower frequencies provide relatively high voltage across electrodes and thus generates high electron energies with a corresponding increase in ionization probability. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to operate the second radio-frequency power source of Kim et al. at a lower frequency than the first radio-frequency power source as taught by Westendorp et al. since lower frequencies provide relatively high voltage across electrodes which in turn generates high electron energies with a corresponding increase in ionization probability.

Kim et al. fail to specifically teach a first matching device and a second match device.

Referring to Figure 1 and column 4, line 62- column 5, line 11, Suemasa et al. teach a plasma apparatus having a first matching device 156 and a second matching device 144 . It is well known in the art to use an impedance match network to provide efficient power transfer between the power supplies and the electrode. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the RF power supplies of Kim et al. with a first matching device and a second match device as taught by Suemasa et al. since it results in efficient power transfer between the power supplies and the electrode.

With respect to claim 4, first matching device of Kim et al. in view of Westendorp et al. and Suemasa et al. is electrically connected to said bottom electrode via a non-coaxially structured feeding rod (Fig. 9 of Kim et al.).

With respect to claim 8, the substrate to be processed is etched by the action of the plasma on the substrate to be processed (abstract).

Art Unit: 1763

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Westendorp et al. (U.S. 5,565,036) and Suemasa et al. (U.S. 6,089,181) as applied to claims 1, 4-6, and 8 above, and further in view of Fukasawa et al. (5,342,471).

The teachings of Kim et al. in view of Westendorp et al. and Suemasa et al. have been discussed above.

Kim et al. in view of Westendorp et al. and Suemasa et al. fail to teach a bottom electrode is supported on an insulator plate.

Referring to Figure 1 and column 2, lines 34-51, Fukasawa et al. teaches a plasma processing apparatus wherein the bottom electrode 12 is supported on an insulator plate 14. It is conventionally known in the art to support a bottom electrode with an insulator plate in order to prevent conduction between the bottom electrode and the chamber. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to support the bottom electrode of Kim et al. in view of Westendorp et al. and Suemasa et al. with an insulator as taught by Fukasawa et al. since this would prevent conduction between the bottom electrode and the chamber.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Westendorp et al. (U.S. 5,565,036), Suemasa et al. (U.S. 6,089,181), and Fukasawa et al. (5,342,471) as applied to claim 2 above, and further in view of Brasseur (U.S. 5,298,466).

The teachings of Kim et al. in view of Westendorp et al., Suemasa et al., and Fukasawa et al. have been discussed above.

Art Unit: 1763

Kim et al. in view of Westendorp et al., Suemasa et al., and Fukasawa et al. fail to teach a first matching device disposed in a space in the chamber.

Referring to Figure 1, Brasseur teaches a plasma processing apparatus wherein the matching device 6 is disposed in a space in the chamber. Additionally, the mere rearrangements of parts which does not modify the operation of a device is a prima facie obvious. In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950). In re Kuhle, 526 F.2d 553, 188 USPQ 7 (CCPA 1975). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the first matching device of Kim et al. in view of Westendorp et al., Suemasa et al., and Fukasawa et al. in a space in the chamber since it is conventionally known and the mere rearrangements of parts which does not modify the operation of a device is prima facie obvious.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Westendorp et al. (U.S. 5,565,036) and Suemasa et al. (U.S. 6,089,181) as applied to claims 1, 4-6, and 8 above, and further in view of Collins (U.S. 5,707,486).

The teachings of Kim et al. in view of Westendorp et al. and Suemasa et al. have been discussed above.

Kim et al. in view of Westendorp et al. and Suemasa et al. fail to teach the capacitance of the bottom electrode is set to 50 pF.

Referring to column 12, lines 2-6, Collins et al. teaches a plasma processing apparatus wherein the bottom electrode 32C has a capacitance value of 50 pF in order to diminish the losses due to the load mismatch (col. 11, lines 59-63). Thus, it would have been obvious to one

Art Unit: 1763

of ordinary skill in the art at the time of the invention for the capacitance value of Kim et al. in view of Westendorp et al. and Suemasa et al. to be set to 50 pF as taught by Collins et al. in order to operate the bottom electrode at the desired parameters to diminish losses due to the load mismatch.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Schneider et al.'408, Matsuhara et al.'730, and Fujimoto et al.'820 teach plasma processing apparatus having multiple power sources connected to the bottom electrode.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (9:30 -6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number: 10/810,694

Page 8

Art Unit: 1763

Michelle Crowell
Patent Examiner
Art Unit 1763

A handwritten signature in black ink, appearing to read 'M. Crowell'.

Parviz Hassanzadeh
Supervisory Patent Examiner
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A handwritten signature in black ink, appearing to read 'P. Hassanzadeh'.